

FRUGAL PRODUCT DEVELOPMENT: THINK BEYOND CONVENTIONAL PRODUCT DEVELOPMENT APPROACH TO “ENSURE CUSTOMER SATISFACTION, BY FAMILIARIZING PRODUCT AND ITS PERFORMANCE”

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ABSTRACT

Customer satisfaction is one of the key elements, to be successful in competitive business. The big challenge in front of every manufacturers, irrespective of Industry they are in is; how to satisfy customers. By and large customer satisfaction is mostly measured after the product or service is launched. Once we have customer feedbacks, its important to understand and categorize as Defects and Dissatisfactions. Ideally Defects shall be treated by improving the product, whereas Dissatisfaction items have to be treated carefully case-by-case. As in the case of Indian Automotive Industry, there are considerable amount of First time car buyers who might not be fully aware of Products' features. So its important that manufacturer deals it with specific care on how Product features are communicated to customers and how familiar are they with the same. This plays a vital role in deciding Customer satisfaction. Though many attempts have been made to capture customer voice during design phase and to consider in formation of specification through Quality Function Deployment, it mainly focuses on Defects only, not Dis-satisfaction which is purely driven by customer expectations. This paper attempts to understand and address Dissatisfaction items by Customer familiarization. A sample case of Passenger car Real world Fuel efficiency has been taken in to study and demonstrated that appropriate Customer familiarization brings sizeable results and improves customer satisfaction.

KEYWORDS: Customer Satisfaction, Defects, Dissatisfaction, Customer Familiarization, Real World Fuel Efficiency, New Product Development

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1. INTRODUCTION

Organizations in any consumer business have now higher level of awareness about importance of Customer satisfaction. This is relevant irrespective of type and size of organizations. Higher cost of gaining new customers than to keep existing ones are widely recognized including strong correlation between Customer satisfaction and company's performance. In simple terms, Customer satisfaction is measured as Product or Service's ability to perform in relationship with customer expectations [1]. In the past decade, Product Quality and Reliability were considered to be main drivers of customer satisfaction. But ever increasing competition and technology improvements made sure that Product Quality and Reliability are a must for survival. So, eventually a

company has to take more steps to satisfy the customers and to be able to create a differentiation in their Product and/or service offerings. This covers steps to understand factors influencing or affecting customer satisfaction and device an approach to improve product or service offer that can meet or exceed customer expectations

2. CUSTOMER SATISFACTION AND ITS IMPORTANCE

Customer satisfaction is an indication of the level of performance of the product or service in comparison to customer expectations that are stated and implied. The preference or choice with which customers buy the products will eventually decide market share of any manufacturer. Such scenario bring utmost importance for the organization to device processes and methods to understand customer expectations, convert in to a technical specification, manufacture and validate the product according to the specification. This approach shall be meticulously followed during Design and Development stage [2]

2.1 Levels of Expectations and Customer Satisfaction

Customer expectations or for a product or service are broadly classified in to following categories namely; Basics or Musts; Performance or Wants, Exciters or Delighters. Same is explained in Figure 1 [2]

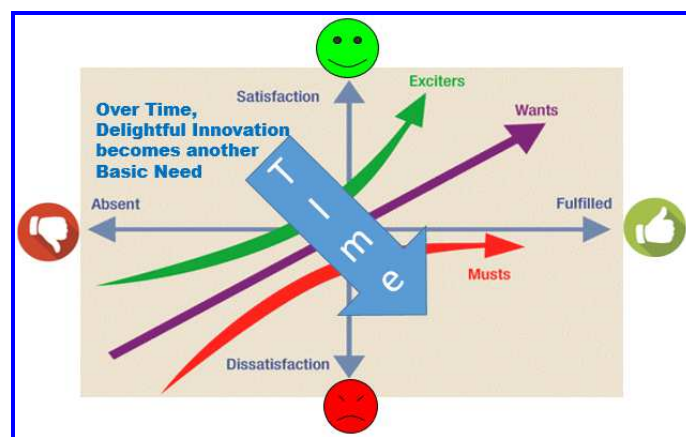


Figure 1: Kano's Model [2], by Prof. Noriaki Kano

2.1.1 Basic Needs

Basic needs, also called as Musts are the ones that are basic in nature and every customer expects it. Generally these needs are not stated but well implied. If it is fulfilled Customers do not notice it, but when its not or partially fulfilled it will draw customer's attention and lead to dissatisfaction. So manufacturers have to pay high attention to this expectation as it can make or Break the business. One simple example of this type of need is, when a customer orders a Coffee in a hotel, he or she doesn't say that it has to be hot, but it is implied. If it is hot customer is neutral, if it's not so, it bring high order of dis-satisfaction

2.1.2 Performance Needs

Performance needs, also called as Wants are the ones that customers are able to visualize and use it consciously during valuation and decision making process of choosing a product or service. Generally these are stated, though not necessarily precise enough. This type of need has a straight forward correlation with Satisfaction. If it is demonstrated by the product customer is happy, if not customer is dissatisfied. For example, Fuel efficiency of a car as stated in the product

brochure. During normal usage, if the car delivers promised fuel efficiency customer is satisfied, if not brings dissatisfaction

2.1.3 Excitement Needs

This type of need is the most influential of the three, which is also called as Exciters. These are neither stated nor implied by customer, not even expected. This is basically a pleasant surprise by the product or service which has a huge advantage and can potentially bring radical improvements in customer satisfaction. Generally such exciters come from Innovation. Key point here is it keeps moving, what is Innovation today will be normal expectation in few months or years. An example of such needs is; Amazon prime’s application that can be connected with various devices like TV, Mobile, Tablet. This has an exciting feature to allow you to watch stop and resume from same place even if you switch devices. For example, you are watching movie in TV, stop it, go to your car and resume watching in your mobile from where you stopped in the TV

It is valid to say that above explanation is not static, but dynamic over a period of time. Also varies from customer to customer. What is considered as Basic by one customer might be Delighter by other customer. So the organization has to pay enough attention to have right mix of all needs taking into account diversity of its customers

2.2 Why Customer Satisfaction is Important

Customer satisfaction, or Dis-satisfaction when the Product doesn’t meet expectations, can have serious effect on organization’s business objectives. Dis-satisfied customers can take actions in public or in private, both will impact Brand image, thus also affecting sales. Typical reactions of a dis-satisfied customer are shown in the below figure [3]. So, to be successful in any Industry, it is necessary to deeply understand, analyze and find ways to appropriately address it in the product or service offered.

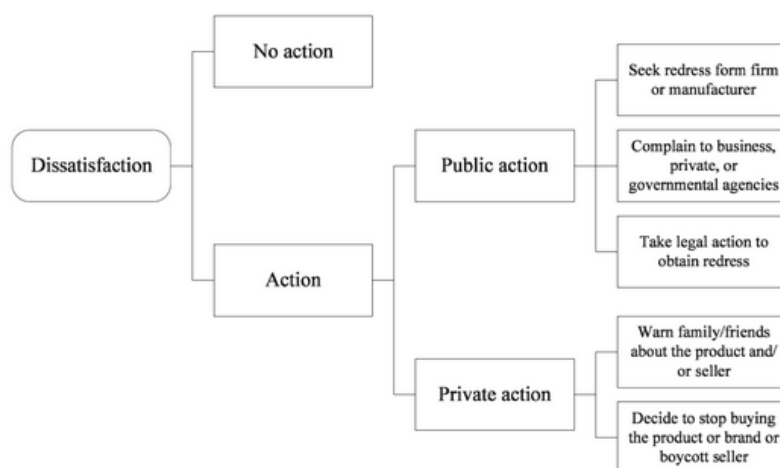


Figure 2: Importance of Customer Satisfaction [3]

3. TYPES OF FAILURES IN PRODUCT THAT CAN LEAD TO CUSTOMER DIS-SATISFACTION

Typically customer dissatisfaction comes when their expectation is not met. As this paper focuses on, how to address Customer dissatisfaction items by appropriate Customer Education or Familiarization, the discussion will be limited to Dis-satisfaction arising out of insufficient understanding of product features or usage. We will exclude other

potential dis-satisfaction aspects like Service, Cost, etc. The Possibility of product not meeting customer expectation can be due to different parameters but generally classified in to two aspects;

- Defects, due to poor quality and/or reliability of a product
- Function or Features not meeting expectations, also called as Dis-satisfaction items

3.1 Why Defects Happens

Defects can happen either due to Poor Quality or poor Reliability. Let's understand the meaning and difference between Quality and Reliability. Classical Text book definition of Quality as per ISO 8402-1986 is, *"Totality of features and characteristics of a product or service that bears its ability to satisfy stated or implied needs"*. Quality guru Juran defines *"Quality is fitness for use or purpose"*. Quality or Poor Quality is often measured in Defect rate like, Percentage failure, Parts per Million (PPM), etc., On the other hand Reliability is *"Probability of a product or service performing its intended function, under specified conditions over a period of time"* [4]. In simple terms Reliability is, *"Quality over a period of time"*

3.2 Function or Features not Meeting Customer Expectations (Dis-Satisfaction Items)

This is perhaps most difficult expectation of a customer to meet or exceed, as it varies customer to customer and also its about customer perception. One feature expected by customer may be an unnecessary to other customer. Nevertheless, its absolutely necessary to take care of this aspect of customer expectation, to be ahead of competition. Customer satisfaction by enlarge is a combination of "Product being defect and dis-satisfaction free. For example, a first time car buyer can face a Fogging issue in the windshield during the rainy season if he uses Air conditioner in the same way it's operated in a sunny day. Once customer faces such issue, he will project it as a failure. However, it's the responsibility of manufacturer to educate or familiarize customer on all features in the car and how to operate it under various conditions. This is also called as "Customer education". In Automotive Industry, where lot of efforts have been made to understand customer perception, so that manufacturer can either meet it or work on customer education. Mostly it is done through surveys, by the company themselves or through external agencies. Let's take an example of Initial Quality Study of cars, called as IQS.

3.2.1 Initial Quality Study – Example of Capturing Customer Expectations and Feedback

Initial Quality study conducted by an organization JD Power by directly interacting with consumers of passenger cars. This extensive study includes collecting consumer voice against a set of well-defined questions covering various sub-systems and functions of a car. This data can be very useful for vehicle manufacturers to understand customers view point of their product in absolute and in relative sense with competitor products. JD power contacts users who have experienced their new car for a period of 2 to 6 months and the result is summarized as "Problems per 100 vehicles", also called as PPH. Study is conducted through Face to Face interview of customers, with 228 questions covering 8 vehicle categories mentioned below [5];

- Exterior
- Seat
- Driving Experience

- HVAC (Heating, Ventilation, Air Conditioner)
- Feature control display
- Interior
- Audit Navigation
- Engine, Transmission

3.2.2 Limitations in Current Practice of Capturing Customer Expectations in Design Phase

Current Quality and Reliability assurance practice ensures the Product is designed and validated to be defect free. However for Dis-satisfaction items, most of the companies are in reaction mode, as it's a perception issue and all feedback cannot be predicted during Design and Development. For example, Survey results are used to understand PPH (Problems per Hundred vehicles) level and Product's position with respect to competitors. Actions are taken considering relative ranking, as every car will have some PPH (It cannot be Zero), also called as Industry average.

4. INDIAN AUTOMOTIVE OVERVIEW

Indian Market continues to be a good market for automotive sector. The sales in passenger car vehicles contribute to 13% of the overall vehicle sales in India. But in terms of value, the Passenger car sales contribute to 53% of the total vehicle sales value. [6]. In FY14, Automotive Industry's turnover was accounting to more than 45% of India's manufacturing GDP [7]

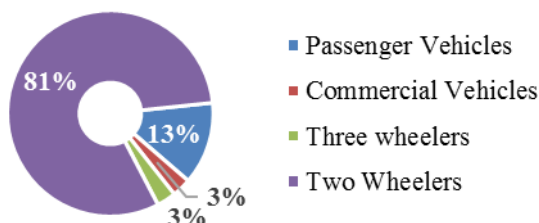


Figure 3: Indian Automotive Sales Split by Volume in 2015 [6]

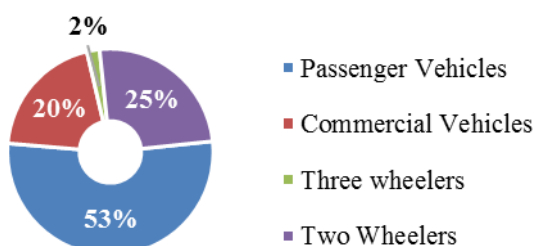


Figure 4: Indian Automotive Sales Split by Value in 2015 [6]

4.1. Fuel Economy in Indian Market

4.1.1 Indian Customer's Perspective: Car Purchasing Power & Relationship with Fuel Economy

In a study conducted by Deloitte [8], In developed markets where car is purchased and used for Individual needs, whereas in India car is purchased for family purpose, especially in the case of first time car buyers. Technology and need for more space are rated as the top triggers in purchase decision of a car for a re-buyer. But the study for each vehicle segment from NCBS (New Car Buyer Survey) [9], indicates the importance of Fuel economy in Indian market. Fuel

economy remains in top 3 for all the segments as purchasing reason for a passenger car. Such a high importance of Fuel Efficiency coupled with high volumes of production, also plays amounts to huge Co2 output which if controlled can help improving environmental aspects as well.

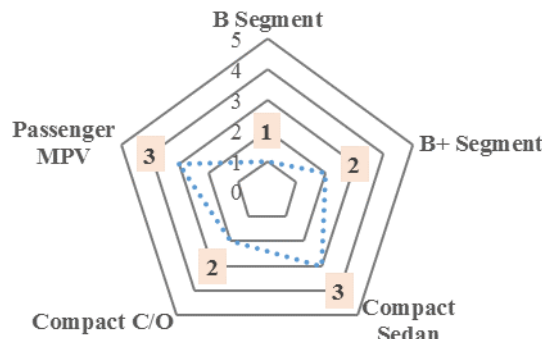


Figure 5: Matrix Indicating Priority of Fuel Economy in Different Passenger Car Segment (1 – Top Most Reason; 5 Least Priority Reason) [10]

4.1.2 Manufacturer's Perspective: Technology Trend for Fuel Economy Improvement

Vehicle manufactures in the recent past invested a lot to develop and industrialize Innovative new technologies and features to enhance consumer experience. Such new technologies covered many purposes including Fuel Efficiency, tail pipe emission optimization, enhancing Engine power and acceleration are to name a few. The major change in engine evolution was on the fuel injection system. Fuel injection in petrol has transformed from carbureted system to throttle body injection and now to Multi-point injection system (MPFI). The days for Gasoline Direct injection (GDI) are not far away. Similar is the story for Diesels with CRDI being almost mandatory for BS4. [11]

5. INVESTIGATION

5.1 Objective of Investigation

This Investigation aims to understand customer satisfaction on absolute and relative manner with reference to other competitor vehicles, focusing on Fuel efficiency. Customer satisfaction for fuel economy is based mostly on the cost which a customer has to spend for fuel across a period of time. This type of fuel economy is commonly referred to as Real World Fuel Economy. Our investigation covers measurement of real world fuel economy among various models in the same segment. Investigation also tries to understand directly from the customers the performance in terms of fuel economy.

5.2 Investigation Methodology

A good indicator of Customer satisfaction is published annually by JD Power (JDP) market survey. The survey is published every November is under the name 'Initial Quality Survey' generally known as IQS. It covers the feedback of customers about various aspects of vehicle performance like Engine, Transmission, Body, Chassis etc. JDP gives a good reference of a particular model's position compared to its competitors in its segment. [9]. But the survey fails to explain the cause of dissatisfaction for the customer. So, our investigation goes a step ahead to understand the reason for the customer being unhappy with the vehicle. Private survey is a tool used for this paper to deep dive into the concern.

5.3 Survey Details

B-segment models has been chosen for investigation. Entry level car owners tend to have more dissatisfaction based on study [12]. Direct face to face interview is the mode of communication where customer is asked detailed questions based on a pre-determined questionnaire. Three models from different brands are covered in the survey.

Table 1: Survey Samples & Characteristics

| | |
|--------------|-------------------------------------|
| Segment | B – Segment Petrol |
| No of models | 3 |
| Sample size | 100 each |
| Survey mode | Direct Interview with questionnaire |

6. OBSERVATIONS / SURVEY RESULTS

6.1 On-Road Fuel Economy in Real Usage

On-road Fuel economy was measured for all the three vehicles using back to back driving methods. Evaluation followed internal test standards and was measured in both City and Highway. Interestingly, real world fuel economy was almost similar despite having different declared fuel economies.

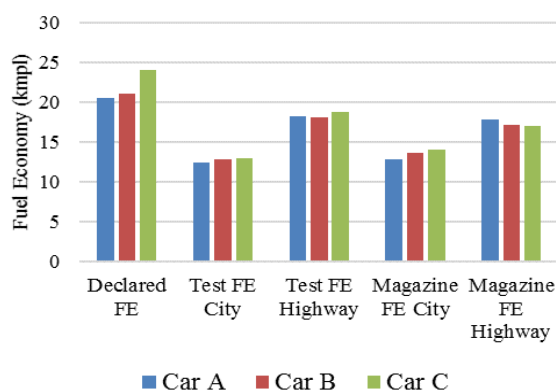


Figure 6: Comparison of Fuel Economy (Declared & Real World) of Entry Segment Passenger Cars

The major difference for the gap between On-road and declared value being the driving atmosphere in actual road conditions and homogenous test conditions. This was also proved by Anand et.al [13] where the authors found considerable difference in actual and homologation test cycle. The actual road cycle show more frequent speed variation and steeper acceleration events than the test cycle.

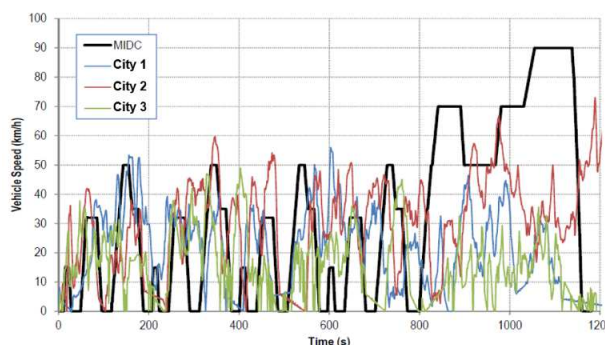


Figure 7: Comparison of Driving Pattern between Homologation Driving Cycle and Actual City Driving [10]

6.2 Survey Results

Based on the survey, it was found that around 8-12 % were unsatisfied with fuel economy of their vehicles. City driving found to have majority of dissatisfaction, covering 80% of overall unhappy customers.

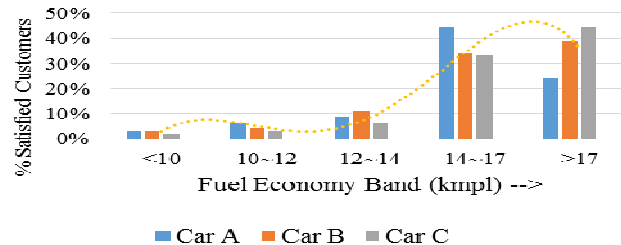


Figure 8: On-Road Fuel Economy and Customer Satisfaction Ratio

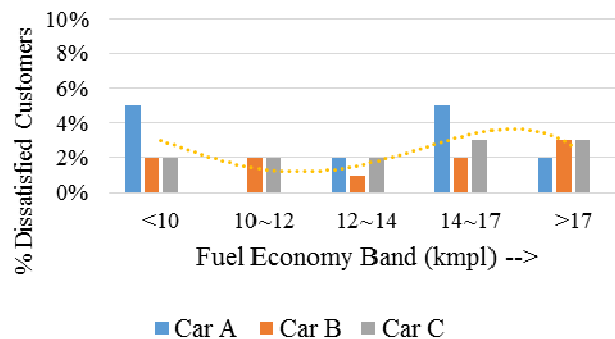


Figure 9: On-Road Fuel Economy and Customer Dissatisfaction Ratio

From the figure 8 and figure 9, it can be seen that Fuel economy dissatisfaction varies from person to person. There are Customers (~ 40 %) who were satisfied when they got the fuel economy in 14-17 Kilometer per Liter (kmpl). In the same band there were customers (~ 3-4 %) who were dissatisfied. Hence, Fuel economy can be classified as a perceived quality item rather than a definitive quality performance.

Also, the dissatisfaction trend curve takes a double bump indication two root causes. First spike is ‘under 10 kmpl’ where the fuel economy was too low in city traffic as per the customer. Upon detailed investigation, it is revealed that customers had very little knowledge on driving for good fuel economy. The driving patterns of the customers were not favorable for good fuel economy.

Similar information is communicated in US market through [14], indicating good driving methods for best fuel efficiency. An extract from [14] is depicted below.

- Rapid acceleration and deceleration with braking can reduce Fuel economy by 33% at highway and 5% in city drive.
- Maintain optimum drive speed, each 5 MPH pver and above 60 MPH can eat fuel efficiency by 7-8%.
- Avoid atleast minimize Idle speed for longer duration
- Avoid loading languages on the roof and keep it in the Boot
- Maintain constant speed using cruise control can help saving fuel consumption, especially in Highways

- Right inflation of tyres by maintaining recommended pressure and using genuine Engine oil which can reduce rolling friction, thus improve fuel economy by up to 5%.
- Wheel balancing helps losses out of rolling unbalance wheels and minimize carrying unnecessary items. Approximately 100 lbs can eat 1-2% fuel economy

Second spike is in ‘14-17 kmpl’ where the fuel economy was not sufficient in city traffic as per the customer. Customer’s expectation is basically the declared value which he has noticed in the vehicle brochure or the commitment given by the sales executives at the time of sale. In short, customers were not aware of the reasons why he cannot achieve the declared fuel economy value by manufacturer. Similar information is communicated in US market through [14], indicating the reason for such unawareness. An extract from [14] which shows the conditions why real world fuel economy can deviate from the declared value is given below.

- Loading the engine alternator with too much of electrical load like Fog lamp, Heater or Air conditioner
- Rapid acceleration and Hard braking
- Keeping the engine running in Idle in traffic signal or traffic jams
- Too cold conditions which lowers thermal efficiency of the engine
- Inappropriate tire pressure

To sum up, small percentage of customers were unhappy with the fuel economy performance. The main reasons for dissatisfaction was due to lack of awareness of fuel economy and best practices to achieve the best of it.

6.3 Counter Measure

Careful analysis of survey results indicate that Fuel economy is more inclined to perceived quality. A small percentage of customers have dissatisfaction due to lack of awareness on fuel economy and its associated factors. So, it is mandatory that customers are communicated thoroughly on factors affecting fuel economy and the best practices to achieve best fuel efficiency out of your vehicle. To verify the impact of this familiarization, we explained the key factors affecting the fuel economy and explained good driving pattern to get good fuel economy.

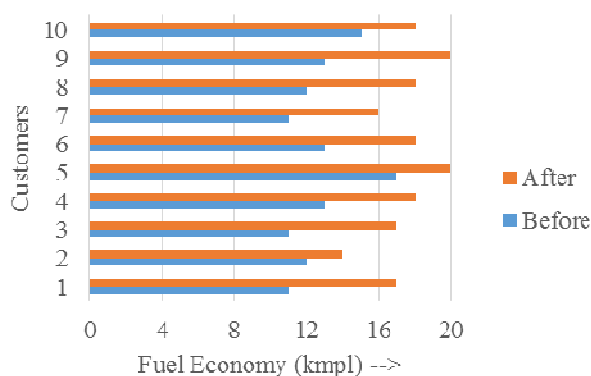


Figure 10: Real World Fuel Economy of Dissatisfied Customers Before/After Awareness on Fuel Economy

The customers who were initially unhappy were made to drive in their usual routes and fuel economy was re-recorded. Figure 11 shows the difference in driving pattern before and after communicating good driving behavior in the same route / traffic.

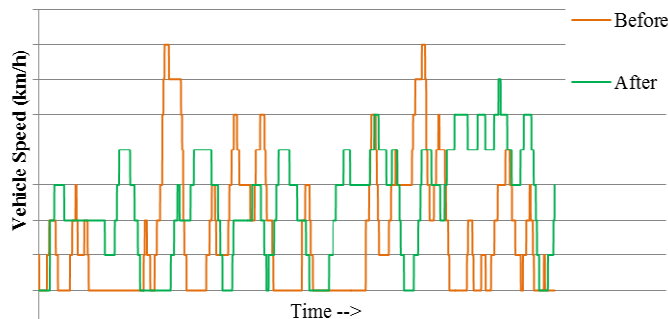


Figure 11: Comparison of Driving Pattern of Same Customer in Same Traffic Conditions Before & After Awareness on Fuel Economy

It was observed that 100% of customers surveyed were happy with the fuel economy they got after driving with good practices. Figure 10 shows the fuel economy values achieved by the customers before and after communicating the key fuel economy information. These customers on an average achieved 25% increase in fuel consumption. This correlates to approximately 30% reduction in CO₂ emissions.

7. CONCLUSIONS

In the modern era of Product Development, Customer satisfaction is not only a function of Quality and Reliability of the Product taken care in Design and Development stage, but also revolves around perceived quality. As the name suggests its Perception of customer, which can be different for each customer and fully depends of either fulfilment or non-fulfilment of their expectations. So, it becomes absolute necessity to keep appropriate communication and familiarization of Product and its features to its customers. This aspect is gaining far more importance when companies face “First time Buyers” (of the product). In the case study explained about, authors were able to demonstrate with data that product meets its declared performance when customer follows a recommended way of driving. When customers realize the fact which was demonstrated in front of them, they were also satisfied with product’s performance. So, the Frugal Product Development approach shall cover not only Design for Quality & Reliability, but also Appropriate Customer familiarization about product, its features and recommended best practices to enjoy the maximum benefit out of the product

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